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ABSTRACT

A number of disadvantages cripple school efforts to face current energy shortages. Most schools were built at a time when energy was inexpensive and abundant and their structural design gave little regard to energy efficiency. Coupled with poor maintenance programs, school facilities may waste as much as 25 to 50 percent of the energy used. As an increasing share of educational budgets is directed toward fuel expenses, higher student-teacher ratios and reductions in the quality of education will result. Extracurricular activities and community use of school facilities may be curtailed and short time school closings and complete disruption of the educational process may even occur. Small rural schools are particularly hard hit. Maintenance or conservation efforts are often assigned to personnel who have other full time responsibilities. Apathy, limited technical knowledge and lack of public support often stiffle attempts to improve energy efficiency. Seldom is there sufficient administrative time or financial support to permit participation in energy clinics or workshops. An energy management program for developing energy-efficient schools is needed. This systematic approach would include assessment by experts of how much energy is used by a school, inspection of facilities to find conditions that cause energy waste, and funds, guidance, and technical assistance given to implement energy efficient improvements. (DS)

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ENERGY AND RURAL SCHOOLING

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Before embarking on a discussion of energy and rural schooling, it is important that there be a basic understanding of the energy problem in the United States. It was not the intent of the authors to present, in this paper, a technical and quantified discussion of the many intricate issues and policies that have led to the current energy problem, but rather to provide several observations which describe the situation.

These observations are as follows:

- The United States production of oil has peaked and is now declining.
- Demand for all types of energy is continuing to increase.
- Imported oil is being used to supply the deficit between supply and demand.
- Undiscovered deposits of oil and natural gas are limited, difficult to find, and more difficult to develop.

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- Existing processing facilities do not have the capacity to meet current demands.
- Available transportation systems are inadequate to deliver the quantity of fuels needed from their source to the point of utilization.
- Environmental regulations limit the utilization of energy resources and increase production costs.
- Development of new energy sources requires decades of research and development.
- Approximately fifty years are required to change from one major energy source to another.

These observations lead to three obvious conclusions. The cost of traditional energy sources will continue to increase, all fossil fuels will be in short supply in the future, and the energy shortage is a long-term problem.

The impact of the energy situation on schools is unique, and requires some explanation. Most schools were designed and built in a time when energy was inexpensive and abundant. Construction funds were limited, and major emphasis was placed on achieving adequate space and elaborate facilities. Little, if any, regard was given for the energy efficiency of the strucrures. Lighting, ventilation, heating, and cooling systems were over designed. These inherent building characteristics, coupled with poor maintenance programs, have resulted in facilities that waste as much as 25 to 50 percent of the energy used (1).

These structural problems are further compounded by the nature

of the public school enterprise. Schools, unlike business and industry, are unable to pass on the higher cost of energy to their customers. Fuel expenditures must be budgeted six to twelve months in advance with only limited information and projections of increased costs for guidance. Budgets are entrenched in traditional expenditure patterns wherein 75-85 percent of the budget is designated for personnel costs, with as little as 3-5 percent allocated for energy. Funds for capital improvements are virtually non-existent. A recent report suggests that over 60 percent of all school districts

> ". . . lack money to undertake changes and modifications in building and in their heating and ventilating systems, needed to conserve fuel. Age of buildings, lack of proper temperature controls, and leaky windows were most often cited as principal obstacles that had to be overcome in order to conserve fuel." (2)

Finally, school systems, particularly rural systems, lack the technical help to solve energy problems. In many cases, maintenance and conservation efforts are assigned to personnel who have other full-time responsibilities. Energy problems cannot be properly assessed because records are incomplete or non-existent. Even when attempts are made to improve the energy efficiency of schools, apathy, limited technical knowledge, and lack of public support bring the process to a standstill. In short, school personnel do not know "what to do," "how to do it," nor have the "money to do it."

The consequences of the total situation are most serious. Higher energy costs are likely to be paid by diverting funds from personnel allocations. The result is higher student/teacher ratios and reduction in the quality of education, and/or a compression of the scope of

educational programs. Likewise, curtailment of extracurricular activities and community use of school facilities may occur. Finally, fuel shortages may lead to short-term school closings and complete disruption of the educational process.

In a report of a survey conducted by the Federal Energy Administration, the dramatic impact of increased energy costs was demonstrated in the following finding:

> "The nation's public schools spent an estimated $514 million more on fuel in 1974-75 than they did in 1972-73. At current salary rates, that represents about 43,000 teaching positions." (3)

Although in many ways school facilities are similar, each have their own energy characteristics. Structures are made of different building materials. Numerous types of heating, cooling and ventilation systems are used with varying degrees of automatic or manual control. Operating efficiencies vary from poor to excellent. Use patterns and climatic conditions differ over a wide range. Therefore, a single solution is not practical and a unique solution must be devised for each school facility.

Fortunately, there is a systematic approach for achieving these unique solutions. A sound energy management program is the vehicle for developing energy efficient schools. Such a program depends on a detailed assessment of how much energy is used and how it is used. This assessment is followed by an inspection of the facilities to pinpoint conditions or procedures which cause energy wastes. Operational changes or capital improvements can then be selected based on sound economic principles.

The main energy problems of schools are known to be related to excessive ventilation, inefficient boilers, inadequate system control, poor window management, improper insulation, and inefficient lighting. Once the magnitude of these problems is identified through audits and evaluations, well known technology can be applied to solve these problems. Experience has indicated that energy consumption can be reduced by as much as 5 to 25 percent by changes in operating procedures. An additional 25 to 35 percent reduction can be achieved through capital improvements. (4)

While the problems identified above may be related to nearly all public school systems, the fact remains that by far the large majority of school systems in this country serve rural areas.

The Digest of Education Statistics (1977-78) indicates that over half of the nearly 16,000 operating school districts in 1975-76 enrolled fewer than 1,000 students and approximately three school systems of every four enrolled fewer than 2,500 youngsters. While school systems enrolling fewer than 2,500 students are not, de facto, classified as rural, by far the majority of these schools do serve either small towns or predominantly rural areas. Moreover, most of the approximately 4,000 districts enrolling over 2,500 students do so through some schools located in rural areas.

A further evaluation of the demographic data relating to school size and location suggests that small rural schools are distributed across the fifty states. Fourteen states located in every region of the country report 30 percent or more of the local education units

enrolling fewer than 300 students (see Appendix A).

It can be demonstrated then, that the vast majority of school systems face the challenge of energy conservation without benefit of the human and technical resources which are often available to larger systems because of inadequate administrative support or proximity to technical assistance. Because of these factors, many of the proposals advanced for dealing with energy problems are either impractical or irrelevant. Moreover, the availability of information is sharply diminished due to the fact that administrators and school board members serving rural schools are less likely to come in contact with those experts who might help them.

In small rural school districts there is not sufficient administrative time or financial support to permit participation in energy clinics, workshops or even state, regional and national meetings where such issues are discussed. When opportunities are provided to attend such meetings, the focus tends to be on solution of problems in larger systems. Nevertheless, energy related problems are as important, if not more important, in the small school system as in the larger systems. The problem is complicated by the large number of local schools districts involved and the shortage of accurate and relevant information specifically related to the concerns of small rural schools.

In addition to the real concern of increasing cost which confronts every school and the necessary application of technology to reduce energy waste, public schools face the additional challenge of shaping

attitudes and providing information about energy and conservation. These tasks are clearly within the historic mission of the public schools and the emphasis on a conservation ethic entirely consistent with rural traditions.

The recent national assessment of energy awareness among young adults entitled Energy, Knowledge and Attitudes conducted by the Educational Commission of the States illustrates how inadequately informed America's young adult population is about energy and conservation as well as their heightened awareness and concern about the problem. The report concludes,

> ". . . that 95 percent of the young adults apparently believed that topics like basic energy knowledge, energy problems, the future of energy, etc., should definitely be an important part of every school's curriculum. However, full-scale educational implementation of energy information in schools remains a somewhat distant goal. The consultants referred to a recent study, "The Status of School Energy Education Policy," which indicated that while some exemplary materials on energy are available for incorporation in the usual school curricula for grades K-12, there appears to be little widespread communication and cooperation within or between states to further energy education." (5)

If the rural schools of America are to make significant contributions by providing information and shaping of attitudes, they must have access to curriculum and materials designed to accomplish those tasks. The NAEP report suggests that such information must deal with the following categories of information at least.

(A) Practical knowledge (application).
(B) Technical knowledge.
(C) Global interdependence.
(D) Socioeconomic interdependence.
(E) Technical interpdependence. (6)

While the problems facing rural schools are complex, the solution of energy problems in rural areas may be enchanced by the sociology of the rural community. Although often limited in resources and the amount and type of information received, the rural school system is advantaged in some ways by its smallness. Rural schools continue to serve as centers for communities rather than the center of political debate and acrimony which increasingly characterizes the larger systems. The nature of the rural community tends more toward cooperation than competition; decisions are reached quickly and implemented efficiently while large units are often forced to delegate, refer and debate. As mentioned earlier, the rural school community is more likely to have a greater understanding of and appreciation for a conservation ethic which permeates school board, teachers, parents and students alike.

In short, if adequate and accurate information can be made available to rural schools, the chances are it will be put to use much more quickly than in the larger systems. Thus, successful energy programs in rural schools well might provide effective energy lessons for the public at large.

It should be reiterated that the type of information and recommendations currently available may not be appropriate for the small and/or rural school system. The recommendations found in the AASA report entitled School Energy Crisis: Problems and Solutions are, for the most part, only marginally relevant to the small school system with perhaps fewer than 20 percent of the suggestions applicable. (7)

The need then, exists to develop, identify and disseminate practical, useful and effective information and practices which can assist rural schools as they face the problems associated with declining energy sources and increasing energy costs. The information must address short range facility and utilization issues as well as long range program and curricular issues. With limited access to technical assistance, insufficient in-house administrative support and inadequate resources to permit consultation or participation in professional meetings, clinics or seminars and a paucity of relevant information appropriate to the concerns and conditions of the rural schools, additional action must be taken to adequately serve the 50 to 75 percent of our nation's school systems which serve rural populations. Specifically, this action should provide:

- Information in a usable form and applicable to rural school problems.
- A mechanism to deliver the information to rural schools.
- Funds to implement changes.
- Guidance and technical assistance to school personnel to implement energy efficient improvements.

In this limited amount of time, an effort has been made to describe the unique nature of energy problems in rural schools, to convey the impact and magnitude of these problems, and to create a recognition of the potentially far-reaching impact of implementing energy management programs and energy curricula in rural schools. The responsibility and leadership for initiating a plan of action lies with the federal government, state departments of education and

national educational organizations. Specific recommendations follow.

The U.S. Department of Energy, in cooperation with the Office of Education of the Department of Health, Education, and Welfare, should establish one or more task forces of engineers, architects, and educators to:

- Conduct a detailed study of the energy conservation programs that have been implemented in rural schools and compare their efforts with the conservation efforts of urban and suburban schools. We believe such a study will confirm our belief that rural school actions can serve as a model for programs in urban schools.
- Develop a set of standards and design criteria for the construction of new school buildings that will integrate energy efficiency with educational functionalism.
- Develop a packet of information designed specifically to enable rural school personnel to implement an energy management program and initiate energy conservation practices.
- Develop a set of detailed curriculum materials designed to teach appropriate energy concepts to the youth of our nation.
- Develop a handbook or reference manual to aid school administrators in effectively utilizing technical assistance available through state and federal governments, utilities, universities, and consultants.
- Develop a syllabus for potential use in credit courses to be available to colleges and universities for use in teacher

certification programs which will enable public school teachers to effectively implement energy curricula into school programs.

- Develop a basic workshop program designed specifically for rural school administrators that can be offered across the nation through the adult/continuing education/extension programs of colleges and universities.

Finally, a national educational organization, in cooperation with state departments of education, should establish a distribution network to provide rural school personnel with available information on energy management and conservation. This network should include linkage with local extension offices for follow-up information and, thereby, linkage to land-grant universities for more detailed technical assistance.

Bibliography

1. Digest of Education Statistics 1977-78, National Center for Education Statistics, U. S. Government Printing Office, 1978, Washington, D. C.

2. School Energy Crisis: Problems and Selections, American Association of School Administrators, 1977, Arlington, Virginia. (1) (4:6) (7).

3. "Survey of Local School Districts' Energy Use", Federal Energy Administration (Executive Summary), 1975. (2) (3).

4. Energy, Knowledge and Attitudes, Report No. 08-E-01, Education Commission of the States, December, 1978, Denver, Colorado. (5:30) (6:29).

APPENDIX A

State	Number of Operating Districts	Number Enrolling 300-2499	Number Enrolling Fewer Than 300
Alabama	127	37	0
Alaska	52	28	19*
Arizona	249	89	115*
Arkansas	383	271	75
California	1042	400	325*
Colorado	181	84	63*
Connecticut	167	74	16
Delaware	26	5	3
Florida	67	12	0
Georgia	187	77	1
Hawaii	1	0	0
Idaho	115	68	27
Illinois	1025	664	196
Indiana	304	179	1
Iowa	449	370	41
Kansas	307	225	51
Kentucky	181	88	3
Louisiana	66	4	0
Maine	222	101	96*
Maryland	24	0	0
Massachusetts	366	121	94
Michigan	577	307	60
Minnesota	439	314	50
Mississippi	150	72	0
Missouri	559	331	155
Montana	579	100	468*
Nebraska	1120	186	912*
Nevada	17	8	3
New Hampshire	157	15	110*
New Jersey	593	315	105
New Mexico	88	41	21
New York	737	393	58
North Carolina	145	24	0
North Dakota	312	91	212*
Ohio	617	345	6
Oklahoma	623	312	272*
Oregon	332	121	163*
Pennsylvania	504	200	0
Rhode Island	40	14	1
South Carolina	92	31	0
South Dakota	196	114	71*
Tennessee	147	54	1
Texas	1116	583	336*
Utah	40	17	1
Vermont	246	46	190*
Virginia	134	38	3
Washington	301	142	86
West Virginia	55	14	0
Wyoming	51	36	5
Wisconsin	436	323	31

*Indicates states with over 30 percent of districts enrolling fewer than 300 students.

Source: Digest of Education Statistics 1977-78. Data reported for school year 1976-77.